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Investigation of the Quaternary History of the Colorado River

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We are exploring the use of cosmic-ray produced radionuclides in surface samples to date the emplacement of colluvial deposits in the eastern Grand Canyon, between Lee's Ferry and Unkar Creek. If these deposits can be dated, the dates can be used as markers to constrain the rates and timing of downcutting of the Colorado River system. These rates in turn can be used to discern the roles of climate in determining the evolution of landscape.

The terraces present in this reach of the Colorado River are formed by debris flows on tributary washes. Downcutting of the Colorado River punctuated by periods of stasis or aggradation results in multiple terraces in which the lowest levels are the youngest. These surfaces are mantled by locally derived rocks, many of which contain chert. Chert samples from terraces afford us the opportunity to use cosmogenic ^{10}Be and ^{26}Al to obtain surface exposure ages for a series of terraces.

With the samples analyzed to date we have demonstrated that chert is a suitable mineral for surface exposure dating using cosmogenic ^{10}Be and ^{26}Al. We can distinguish at least 5 levels which range in age from <2000 a to 140-180 ka. Older terraces show evidence of degradation and yield cosmogenic exposure ages which are younger than is indicated by their stratigraphic level.

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